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كلية الآداب

Architectural Features of Adaptations to Rain in Ancient Egypt
(New Kingdom Examples)

Karim Elsayed Ebrahim Elsayed *

Assistant in the Faculty of Arts, Tourist Guiding Department, Ain Shams University

Abstract:

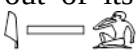
Rain played a great role of nourishment in the barren land of Egypt which comprised two spacious deserts flanking a narrow strip of agriculture. Not only was rain a source of vegetation, but it had also a demolishing effect when too heavy. Observing this fact, the ancient Egyptian took the precautions to adapt to this destructive side of rains. This research displays examples from temples dating back to the New Kingdom as a testimony to this care given to drainage system such as temples of Hatshapsut at Deir El Bahari, Karnak, Abydos and Medinet Habu.

Keywords:

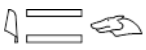
Drainage – Gargoyle - Rain- Roof- Water- Waterspout.

Water spouts and drainage systems are considered to be one of the most prominent and eye-catching features in ancient Egyptian temples. This alluring and fascinating architectural element first appeared in the mortuary temple of Sahura from the 5th Dynasty at Abusir.[1] The function of water spouts was to receive the rains falling on the roof of the temple and to carry them off by the lion headed gargoyles protruding just beneath the eaves and fell to open gutters cut into the pavement. The rain water run downwards through a hole in the temple wall, it goes through a U-shaped system with an aperture that drives water freely into the space[2].

Most of the ancient Egyptian temples were furnished with water spouts to grant a well-equipped drainage system, starting from the temple of Sahure till the Ptolemaic temples of Edfu and Dendenra[3]. In most of the temples, water spouts took the shape of a lion. Unlike the spouts of the Ptolemaic temples where water flows from a gutter inside the temple wall through the mouth of a lion, the gargoyles of the pharaonic temples used to flow the liquid through the lion's breast between his paws[4]. Most of the water spouts in the Ptolemaic temples rested on huge consoles having reliefs and inscriptions with the reference to the lion and some apotropaic representations and engravings for the protection of the temple against any exterior dangers or enemies.[5]

In addition to this important and practical role of the spouts in the ancient Egyptian temples draining the water of the rains to the outside of the temple, they also had a religious significance. As rain was regarded as a manifestation of god Seth and other hostile gods who were thus consumed and expectorated, after being rendered harmless, by the lion, the protector of sacred places[6]. Another opinion has a different view to the lion-shaped water spouts stating that the ancient Egyptians saw water as a sanitizing agent and a purifying element, thus rain water can never be seen as a destroying factor. This opinion depends on the evidence from the Pyramid text (pyramid line 1652c, utterance 600) mentioning that the creation of gods Shu and Tefnut took place by the expectoration of god Atum[7]. Even the verb iSS "to expectorate" has a determinative of a lion spitting out liquid out of its mouth[8]. The word "saliva" was also referred to by the word  , iS [9].

1. Roof Drainage:



At the very beginning of ancient Egyptian architecture, most of the roofs were flat[10]and enclosed by tall side-walls[11]. This was due to the sparse rainfall and the complete absence of snowfall. This fact led to the idea of practical usage of these flat spacious areas (roofs) on the top of the temples and houses. Thus, some of the cult rituals used to take place in the chapels located on the roof of the temples[12], which are called

(roof chapels)[13]. In houses, roofs were used as storage spaces for goods and supplies, as well as a sleeping area especially during the summer season[14]. These flat roofs of temples and houses were really at risk when rain falls. Mud brick ceilings were softened and weakened by the rainwater. The stone roofs were exposed to the infiltration of water through the surface leading to the salt efflorescence which would certainly damage the whole ceiling[15]. Many cautions were subsequently taken to avoid this outcome. As for mud brick roofs, they were covered with plaster and mortar layers so as to make it watertight. On the other hand, stone ceilings were covered by irregular slabs which were put over the ceiling slabs and insertion of patching stones between the joints of the roof. This way, it would be closely sealed and fitted together so that no water enters or passes through[16].

Various measures were taken to protect the Old Kingdom temples against rainwater. The ceiling was covered with a thorough grooved plaster paving, then, it was given a mortar layer to make it more waterproof [17], using also inclined water channels on the top of the roof made water drainage much easier [18]. As an example, is the valley temple of Khafra, where four levels were found in the ceiling area[19]. As water was led from the ceiling to ramps leading to flat collective channels and finally drained to waterspouts[20]. In the precinct of the temple of Sahura, five copper lines basins with lead fillings were found. Two were in rooms near the sanctuary, one in the sanctuary itself, one in the corridor and the fifth in the group of ten storerooms. Copper pipes protruding out of these basins carried off water and any other liquids that were used in rituals and cult ceremonies. These pipes connected with an underground drainage system were made of copper pipes passing under the pavement of the temple and across the causeway leading to an outlet at the southern side.[21].

Starting from the Middle Kingdom was the first more elaborate system for water drainage. In this system, the joints between blocks of the roof were linked together by stone ledges. These stone slabs used to fit exactly to the recesses made in the roof. These slabs were mushroom shaped, so that its rounded top would provide an easy flow of water during rainfall[22]. The best example showing this advanced drainage cautions was during the Middle Kingdom is that in the cover plates on the top of the south temple of Senusert III in Dahshur.[23]

Egyptian buildings in the New Kingdom are provided with elaborate roof drainage systems. The best testimony for this is the the New Kingdom temples which are characterized by richness in roof drainage systems. Subsequently, they are characterized by the abundance of water spouts in various temples. This was due to both the extensions and restorations undergone to the religious buildings as well as the continuous additions to the existing temples that were carried out during this period. It is little known that there are three lion shaped water spouts in the temple of Hatshepsut at Deir el- Bahari in situ. There are no good pictures or detailed

inscriptions for these gargoyles. One of the examples is the water spout located in the northern half of the first terrace[24]. The head of the lion up to the ears is in a good state, but the base of the water spout including the paws of the lion with the drainage channel is broken up. Although many parts of the lion gargoyle are broken, it is sculpted very well. The lion is characterized by delicate facial features, wide rounded eyes and high prominent cheek bones. The mouth is represented as a fine line with details of a moustache above it. The aperture of the gargoyle is plugged, so it seems like this hole was made as a kind of architectural decoration[25] (Fig. 1a).

(Fig.1a): Water Spout from the temple of Hatshepsut at Deir el Bahari
After: Naville, Deir el Bahari II, pl. 31; Capart and Werbrouk, Thebes, p.201fig.123, p.217 fig.139; Werbrouck, Temple d'Hatshepsut, p.33 fig. 4 and 33.

The second gargoyle is located in the northern half (right hand side) of the second terrace between the divine birth chamber and the chapel of Anubis.[26] The simple base with the rectangular channel are kept in a good condition, but the head of the lion is highly weathered. The contours are modeled in the regular way. There is a hole through which rain water is conducted passing by the parapet.[27](Fig. 1b)

(Fig.1b): Waterspout in the second terrace of temple of Deir El Bahari
After: Ventker, B., Starke auf dem Dach, 2012; cat. No. 8b.

The third lion water spout in the temple of Hatshepsut at Deir el Bahari is located in the middle of the southern half (left hand side) of the second terrace which is famous for the scenes of Punt expedition. The lion and the rectangular base are well preserved. A small drainage channel protrudes in the lower part of the gargoyle, just beneath the paws of the lion. It is observed that the paws of the lion and the sculpture of the face are unclear. Unlike the first spout located in the northern part of the first terrace the drain gutter in this gargoyle is located in its lower part[28].(Fig. 1c)

(Fig. 1c): Gargoyle located in the middle of the southern half of the second terrace
After: Ventker, B., Starke auf dem Dach, 2012, Cat. No. 8c

A drain hole at the back of each water spout at the temple of Hatshepsut at Deir el Bahari proves its functionality of it. It is clear that all the three gargoyles were practically used to drain rainwater off. The simple rectangular base along with a small drainage channel is at the borders of

each water spout. Above all these elements is the recumbent lion with its outstretched paws. In the two gargoyles of the second terrace, the paws of the lion was not a part of the pedestal, but the head as well as the paws, formed one block along which runs a small drainage channel. It is unclear how many water spouts the temple of Hatshepsut was originally equipped with[29].

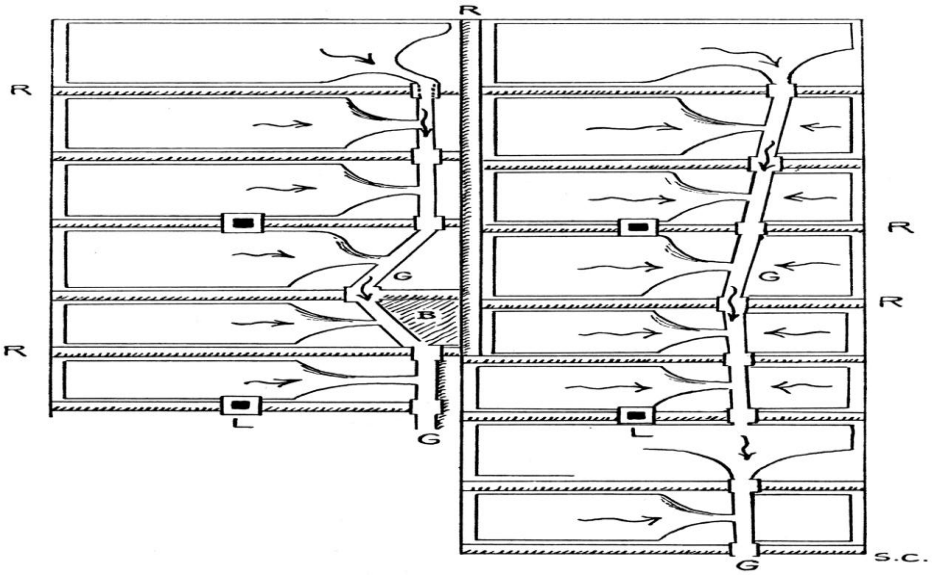
The temple of Ramesses II at Karnak includes six water spouts which discharge rainwater from the roof of the temple. They are divided into two groups, three of them are situated on top of the east wall and the other three on the west one. One of the gargoyles is located on the northern side of the east wall. It is placed directly above the Bubastian gate which Shoshenq I had built between the east wall and the Second Pylon[30].

The ceiling shows three different levels that are connected together by staircases[31]. In the highest level is the ceiling of the courtyard, antechambers and the portico. At a lower level is the roof of the chapel of Amun, while the ceiling of the chapel of Mut and Khonsu is placed at the lowest level. The joints of the roof slabs were protected against rainwater. As rectangular grooves were cut at the point of intersection of each two roof lodges. Then this groove is filled with long narrow stone slabs and is sealed with gypsum mortar. Parts of these capping stones are still well preserved[32]. The ceiling has a slope to help water run to the edge of the roof. In the rear parts of the ceiling are the two gargoyles which are placed in the upper third of the wall beneath the round bar. The rest of the water spouts are located directly in the narrow channeling groove[33]. The northern and middle water spouts are highly weathered that only the drain hole can be seen. The rest of the gargoyles take the shape of a lion with outstretched paws reclining on a simple rectangular base through which runs the drainage gutter.[34]

On temple roofs, rain water was channeled from the highest point of the roof to pass through sloping surfaces and channels before being released through water spouts[35]. One of the techniques that were followed for roof drainage at this time was to cut a square water channel between the roof slabs. This channel used to be carved into two halves in each two neighbor slabs. Then, rectangular stone lodges were used to plug the end of the channel, to prevent water infiltration to the rest of the slabs[36]. This system was used in the three temples, of Seti I at Qurna, Ramesses II's at Ramesseum and Ramesses III at Karnak[37].

The temples of Seti I at both Abydos and El- Qurna have clear examples of the roof drainage of the New Kingdom. As they have a group of drainage points at the end of the sloping roof to release the rainwater falling on the roof of the temple[38]. At Abydos, the cover strips are mushroom-shaped in order to help water to run through the roof of the temple to be released outside it. Square recesses are made in the roof slabs

at the points of intersection of the main drainage channel and the side gutters. The length of each side of these square recesses is 8 inches (20 cm). These recesses served as drain stones which would include several small grooves. As a result, a deviation is noticed in the water path on the roof of the temple of Abydos. On the other side, the water drainage course in the temple of el Qurna tends to be a straight one[39] (Fig.2).



(Fig 2.): Roof of the temple of Seti I at Abydos
After: Neumann, M., Kanalisation, Cat. No. 36; Clarke & Engelbach 1930, 156ff, fig. 180.

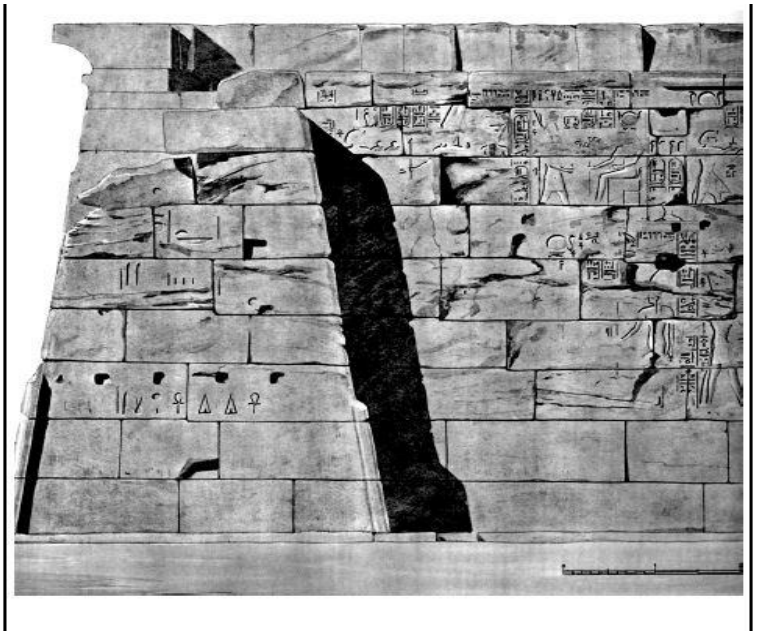
In the temple of Khnum at Elephantine, a water spout is situated in the north east corner of the riverside terrace. It takes the shape of a very small lion which lies with outstretched paws on a simple rectangular base. Its exposed position high in the corner attracts the attention from a very long distance. This place of attachment is unique, as gargoyles are usually placed in the groove in the upper third of the outer walls[40]. This water spout may have been used as an architectural element for decoration only, without practical usage. This is proved by the very small measurements in comparison to the large extension of the riverside terrace which would not give it the ability to control the rainwater. Second, the height at which the gargoyle is located would not make it easy to drain the rainwater off [41].

In spite of the fact that this riverside terrace dates back to the Graeco-Roman period, the name of Ramesses II is inscribed on the base of this water spout[42]. Therefore, it can be deduced that this small lion shaped gargoyle was built as a subsidiary one. It is difficult to assert it actually originates from which building. Subsequently, it is clear that this water spout was used in the immediate vicinity and was not used till the time of Ramesses I(Fig. 3). Thus, it may be attributed to the Ramesside extensions in the temple or temple of the north of Ramesses II[43]. Drainage systems

were used in many of the Ramesside buildings in the temple of Khnum[44]. Many gargoyles along with other blocks got possibly worn out, as they were reused as filling stone in the Greco-Roman period[45]. They were mainly used in the pylon and the riverside terrace.

(Fig.3):A water spout from the temple of Elephantine
Jaritz, J., Elephantine III. Die Terrassen vor den Tempeln des Chnum und der Satet, *AVE 32*, Mainz am Rhein, 1980, pl. 1, 2, 3a and 7; Ludwig, K., *Wasserspeier: Form und Funktion eines altägyptischen Architekturdetails*, München, 1989 , p. 27.

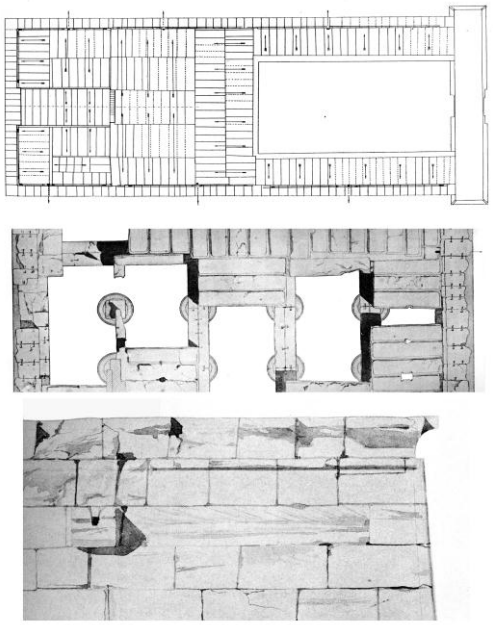
Another significant example for the drainage of the New Kingdom is the chapel of Seti II at Karnak temple (Fig.4), which lies on the right hand side directly after the first pylon. In this chapel, traces of a drainage channels and grooves can clearly be noticed on the blocks of the chapel roof. In this chapel, many architectural elements are missing to get an imagined reconstruction for the drainage system of the chapel. However, Chevrier mentions that water used to flow from the top of the roof towards the eastern wall to the ground where fragments of a water spout were found. In 1931, parts of the tiles of the chapel roof were also discovered in the northern part of the open court in front of the first pylon. These discovered tiles were free from any evidence of a drainage system except for some stone lodges and joints that are linked together[46].



(Fig. 4): Roof of the triple shrine of Seti II at Karnak
After: Neumann, Kanalisation, Cat. no. 138

In the temple of Ramesses III at Karnak, the roof slabs are simple filling stones with square cross section. (Fig. 5) Less protection against water is applied in this temple. It slows down the process of the diffusion of water through the lodges of the roof, but it would not completely prevent it. Clarke and Engelbach suggest that the vaulted part of the roof was smoothed in a later period, but they have no evidence to prove this theory[47]. A strong slope of 0.8:1.6% is noticed in the temple roof which would guarantee an easier water flow[48]. This temple roof drainage system consists of a narrow channel which is divided into several parts. This channel extends along the roof of the temple leading to the western, southern and eastern sides of the temple. Then, water is driven to the six gargoyles situated on different spots on the roof of the temple. Chevrier mentioned that the vertical holes which are located between the roof tiles were provided with a projection to prevent the flow of the rain water to the inner chambers of the temple[49]. Moreover, Chevrier also noticed that in there is no existence for cover strips on the roof some temples. This is clearly noticed in the ceiling of the "Ax Mnw". However, a thick mortar layer has possibly been used as a method of primary protection against rainwater. He suggests that the absence of cover slabs and a complete drainage system in some temples are due to the sparse rainfall especially in Upper Egypt. That is why Chevrier considers that the absence of a complete drainage system with cover strips, channels and grooves is more likely in the temples of Upper Egypt[50]. On the other hand, it is also acknowledged that also heavy rain occasionally falls in Upper Egypt[51]. It would also have been a waste of

time and effort for the masons and architects to carry out elaborate drainage system to temples, if it is not a matter of necessity.

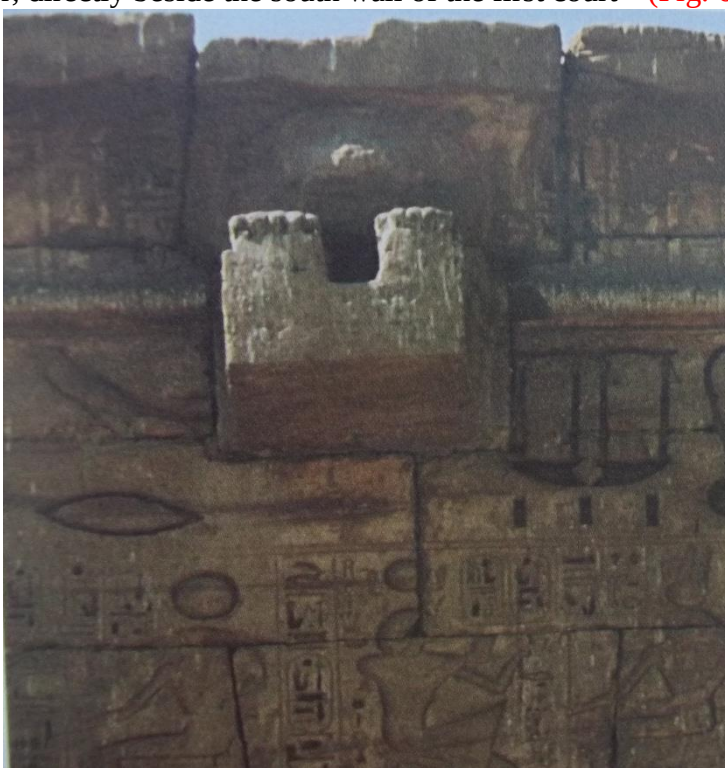


(Fig.5) The roof drainage system of Karnak Temple
After: Clarke and Engelbach, 1930, 155f.

Another example of an exceptional or rain water drainage system of the ancient Egyptian temples is that at El Dakka at Nubia. As the archaeological evidences point out that the architects of the temple were keen on driving the rain water that falls on the roof of the temple to the outside. They managed to do this with no water passing through the hypostyle hall. As they built a hanging ceiling around the hypostyle hall with a bridge-like aqueduct and a channel running through it below the roofing slabs that would drain the rainwater off to the outside of the temple[52].

The mortuary temple of Ramesses III at Medinet Habu has the largest number of water spouts. It includes sixteen water spouts. Seven gargoyles are on the northern and southern walls and two on the rear western wall[53]. Only five of these 16 gargoyles show strongly weathered lion heads. These five spouts are characterized by having a clear drainage hole made out of smoothed stone blocks. The ceiling here as that of the temple of Ramesses III at Karnak was divided into different levels. They are also joined together by staircases[54]. The water spout can protrude out of the wall up to 1.35 m[55]. The roof joints were filled with capping stones which are covered with gypsum mortar[56]. The first courtyard has more than two waterspouts on each of the side walls. None of them were recognized to take the shape of a lion. These four spouts are symmetrically distributed in facing each other

behind the first pylon and immediately in front of the second. They are placed directly under the channeling drum, so that the head of the lion would be surmounting the round bar. They were supposed to drain out water that is dropped from the lateral sides. The rain water lead from the southern colonnade to the side court of the royal palace which is located in the south east corner, directly beside the south wall of the first court[57] (Fig. 6).



(Fig.6): A Water spout from the Temple of Medinet Habu, Ramesses III
After: Ventker, B, Starke auf dem Dach, 2012, Cat. No. 11

Similar to the first court of Medinet Habu, the second court has two water spouts on each of the front and rear walls on the northern and southern sides of the court. Between the two spouts on the south wall another gargoyle is added which does not have a counterpart on the northern wall[58]. These water spouts of the second court are badly weathered.[59] It is also observed that water spouts of the second court are a bit higher than those on the walls of the first court. As for the drainage of the roof of the hypostyle hall, there was only one water spout on the northern wall. There is no evidence for a corresponding one on the southern wall.

The royal palace was provided by two symmetrical water spouts on the north and south wall and two additional spouts on the rear wall. None of these water spouts at the rear walls of the royal palace has a preserved lion. The pedestals are broken and they are taking the shape of a flat block with a hole at the top end of the wall. Based on the remains of the spouts, it is clear

that these spouts sat deeper than those of the first and second court. They are situated almost in the middle of the wall[60].

The lion water spouts at the temple of Medinet Habu were with no doubt properly functioning. As they have the technical requirements to drain water outside of the temple. They are always located at the actual level of the roof. An aperture in the outer wall served to lead the water to another hole between the paws of the recumbent lion[61]. The gargoyles are not decorated and no inscriptions referring to this were found.

الملخص

المظاهر المعمارية للتكيف مع الأمطار فى مصر القديمة(نماذج من الدولة الحديثة)

كريم السيد إبراهيم السيد

اعتبر المصرى القديم مياه الأمطار مصدرا مهما للنماء والخضرة، خصوصاً فى ظل المناخ المصرى الذى يتسم بالجفاف الشديد و جغرافيا البلاد والتى تمثل أغلبها صحراء إلا من شريط ضيق فى الوسط. ولكن كان هناك وجهاً آخر لتلك الأمطار، فعندما تكون الأمطار شديده قد يكون لها أثر عكسى بل و تدميرى أيضاً، لذلك، حرص المصرى القديم على أخذ كافة الإحتياطات والتحصينات التى من المفترض أن تحميه من الجانب المدمر لتلك الأمطار لينعم فقط بما لها من فوائد متجنبا شرورها، يستعرض البحث بعض نماذج وسائل تأمين المعابد و حمايتها خصوصاً فى الدولة الحديثة مثل معابد الدير البحرى، الكرنك، أبيدوس، مدينة هابو.

الكلمات الدالة: أمطار-تصريف- سقف - مزراب- مياه

Notes:

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[13] Roof chapels are buildings used for rituals carried out on the roofs of the large temples. During the Old Kingdom, Astronomical observations used to take place from the roof of the pyramid temples. Zodiac circle is also one of the significant features on the ceiling of the temple of Ramesseum. In the temples of the New Kingdom and the Ptolemaic Period, kiosks were used for the association of the divine images with the Sun God (Re). The only surviving roof chapel is the roofless kiosk on the temple of Dendera with 12 columns with Hathoric heads.

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